



Appendix C

BLE

Radiated Spurious Emissions



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch (SGS-CSTC Shenzhen Laboratory)

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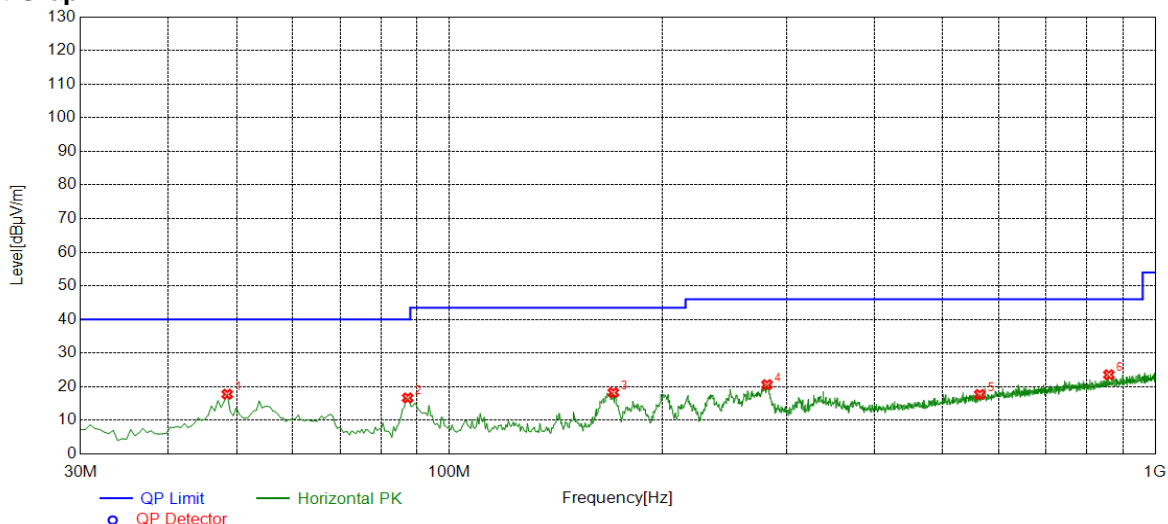


1.1 Radiated Spurious Emission

1.1.1 Radiated Emission below 1GHz

1.1.1.1 Charge + Transmitting

Test Graph



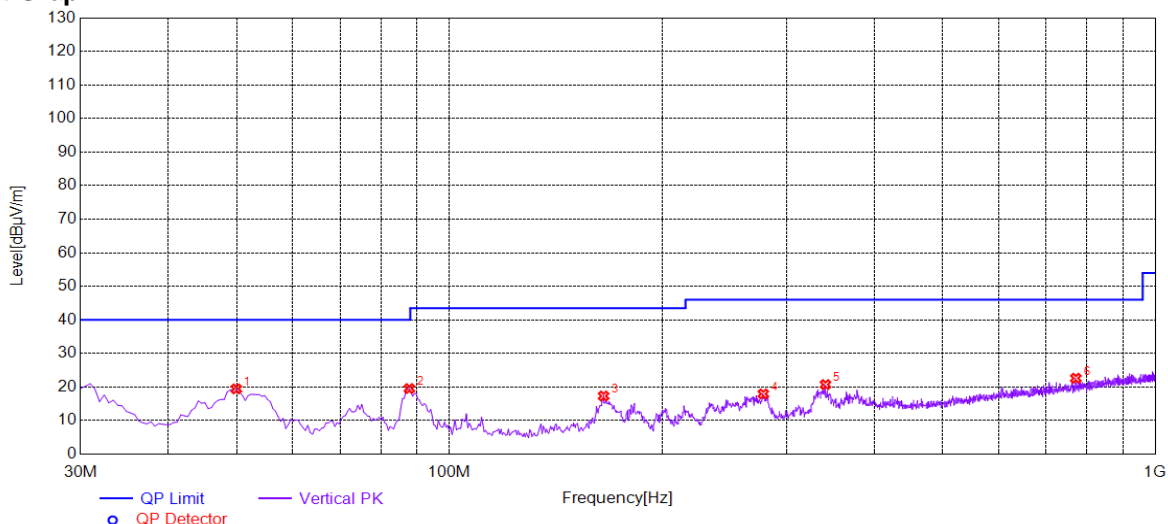
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	48.4392	17.79	-30.19	40.00	22.21	212	275	Horizontal
2	87.2586	16.68	-34.09	40.00	23.32	232	47	Horizontal
3	170.7204	18.25	-33.56	43.50	25.25	113	297	Horizontal
4	281.8409	20.63	-28.34	46.00	25.37	227	300	Horizontal
5	564.2521	17.71	-21.06	46.00	28.29	144	107	Horizontal
6	859.7649	23.58	-15.88	46.00	22.42	178	329	Horizontal

Final Data List



Test Graph



Suspected List

Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	49.8949	19.46	-30.18	40.00	20.54	195	344	Vertical
2	87.7439	19.55	-33.97	40.00	20.45	266	74	Vertical
3	165.3827	17.33	-33.93	43.50	26.17	168	7	Vertical
4	278.4442	17.96	-28.44	46.00	28.04	212	297	Vertical
5	341.0405	20.74	-26.68	46.00	25.26	263	313	Vertical
6	771.9360	22.63	-17.23	46.00	23.37	266	212	Vertical

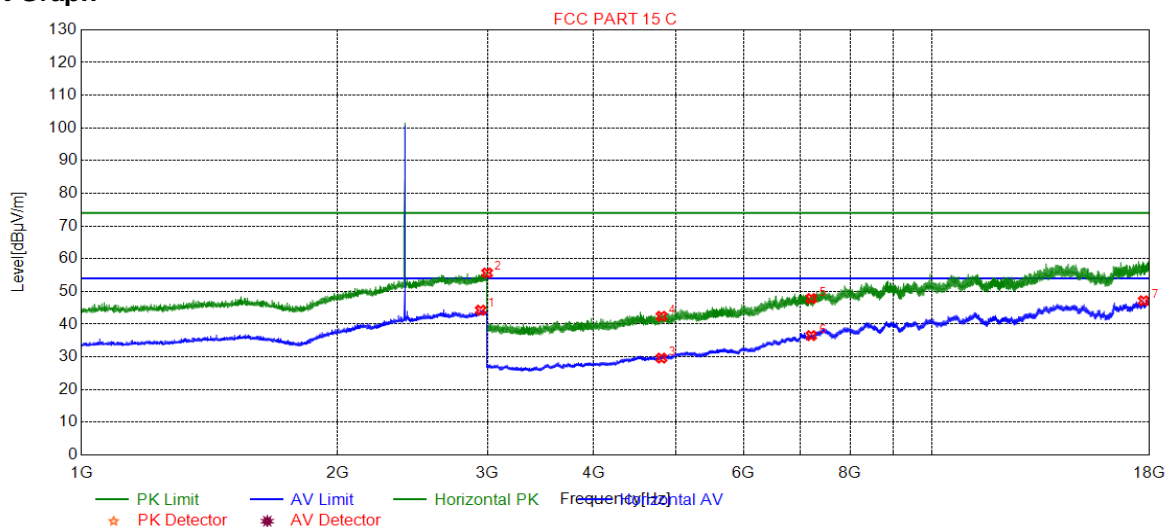
Final Data List



1.1.2 Transmitter Emission above 1GHz

1.1.2.1 BLE_1M_Channel 0

Test Graph



Suspected List

Suspected List

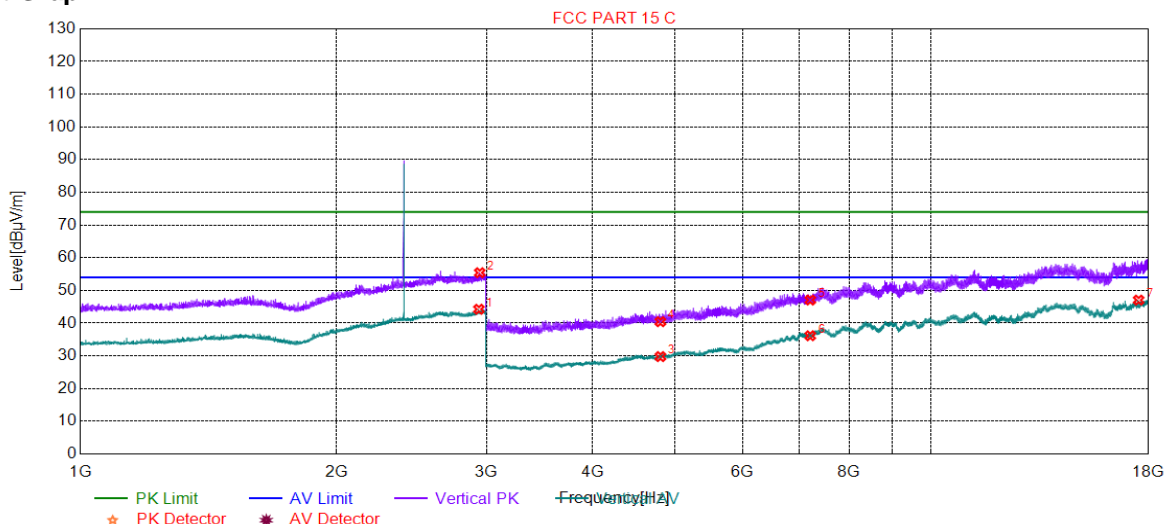
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2945.9865	44.29	9.64	54.00	9.71	174	184	Horizontal
2	2997.9995	55.65	9.46	74.00	18.35	102	280	Horizontal
3	4804.0000	29.63	-18.30	54.00	24.37	241	238	Horizontal
4	4804.0000	42.42	-18.30	74.00	31.58	128	211	Horizontal
5	7206.0000	47.85	-10.09	74.00	26.15	133	141	Horizontal
6	7206.0000	36.51	-10.09	54.00	17.49	135	141	Horizontal
7	17710.1355	47.16	1.16	54.00	6.84	174	91	Horizontal

Final Data List



1.1.2.2 BLE_1M_Channel 0

Test Graph



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2939.4849	44.27	9.57	54.00	9.73	183	38	Vertical
2	2946.4866	55.43	9.64	74.00	18.57	244	205	Vertical
3	4804.0000	29.79	-18.30	54.00	24.21	293	294	Vertical
4	4804.0000	40.46	-18.30	74.00	33.54	231	184	Vertical
5	7206.0000	47.08	-10.09	74.00	26.92	155	242	Vertical
6	7206.0000	36.17	-10.09	54.00	17.83	249	342	Vertical
7	17521.4761	47.07	1.00	54.00	6.93	252	42	Vertical

Final Data List

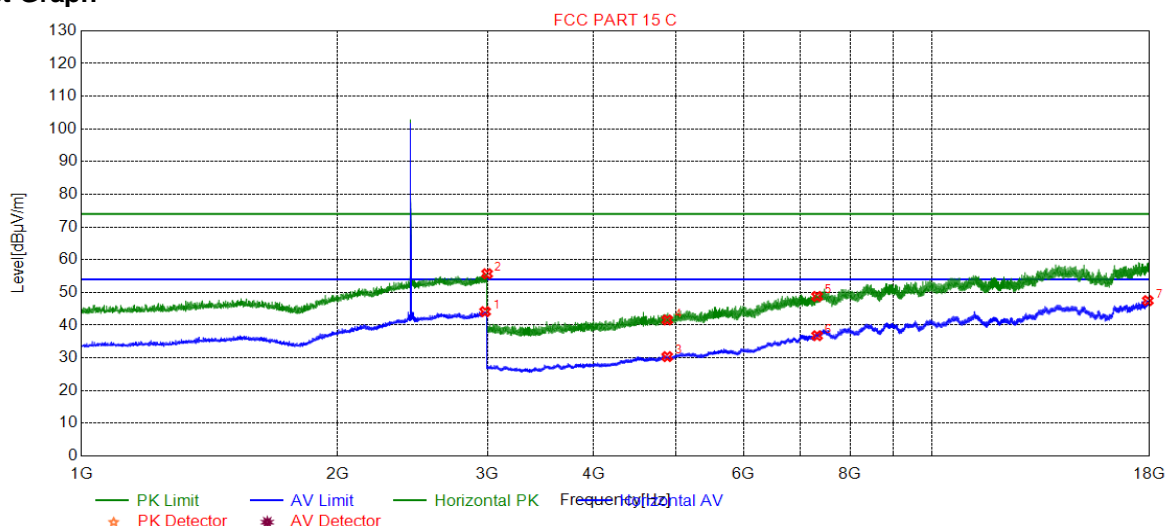


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1.1.2.3 BLE_1M_Channel 19

Test Graph



Suspected List

Suspected List

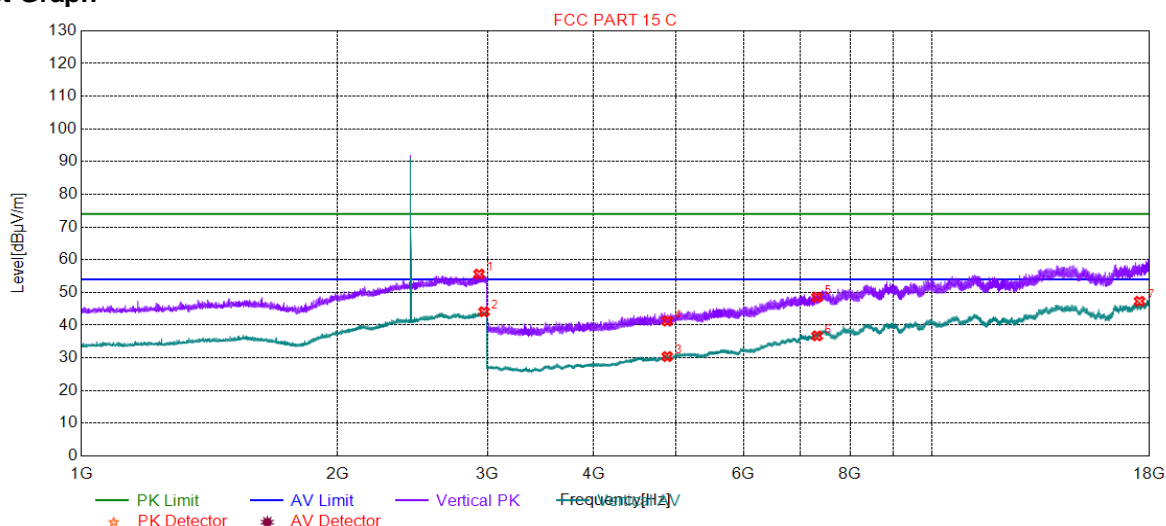
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2981.4954	44.14	9.54	54.00	9.86	214	183	Horizontal
2	2997.4994	55.72	9.46	74.00	18.28	191	18	Horizontal
3	4880.0000	30.39	-17.97	54.00	23.61	146	347	Horizontal
4	4880.0000	41.61	-17.97	74.00	32.39	248	292	Horizontal
5	7320.0000	48.80	-9.72	74.00	25.20	123	40	Horizontal
6	7320.0000	36.79	-9.72	54.00	17.21	154	140	Horizontal
7	17912.5456	47.51	0.69	54.00	6.49	241	140	Horizontal

Final Data List



1.1.2.4 BLE_1M_Channel 19

Test Graph



Suspected List

Suspected List

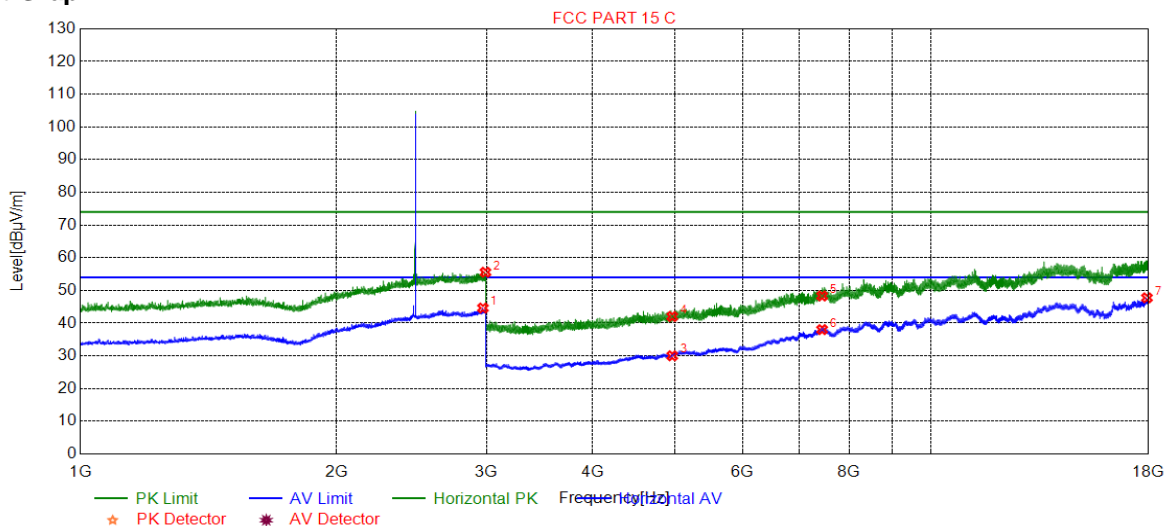
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2932.9832	55.62	9.50	74.00	18.38	195	163	Vertical
2	2972.9932	44.11	9.57	54.00	9.89	259	274	Vertical
3	4880.0000	30.42	-17.97	54.00	23.58	268	127	Vertical
4	4880.0000	41.28	-17.97	74.00	32.72	167	292	Vertical
5	7320.0000	48.58	-9.72	74.00	25.42	221	291	Vertical
6	7320.0000	36.73	-9.72	54.00	17.27	220	342	Vertical
7	17515.9758	47.31	0.98	54.00	6.69	288	0	Vertical

Final Data List



1.1.2.5 BLE_1M_Channel 39

Test Graph



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2971.9930	44.64	9.58	54.00	9.36	156	156	Horizontal
2	2992.4981	55.57	9.48	74.00	18.43	158	279	Horizontal
3	4960.0000	30.03	-17.47	54.00	23.97	216	100	Horizontal
4	4960.0000	42.04	-17.47	74.00	31.96	127	155	Horizontal
5	7440.0000	48.33	-9.35	74.00	25.67	240	291	Horizontal
6	7440.0000	38.04	-9.35	54.00	15.96	199	291	Horizontal
7	17919.6960	47.76	0.70	54.00	6.24	145	141	Horizontal

Final Data List



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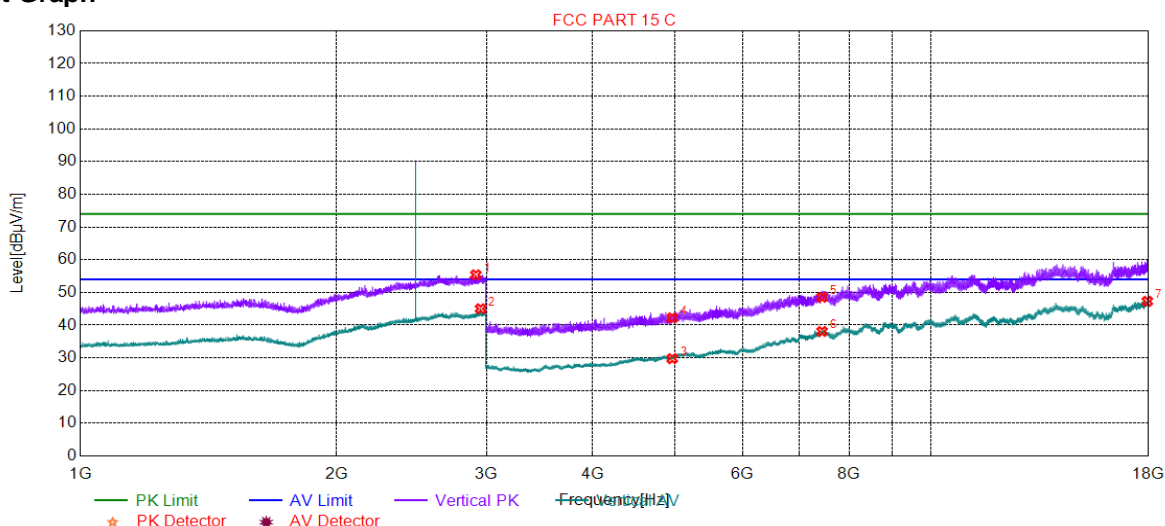
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1.1.2.6 BLE_1M_Channel 39

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2915.4789	55.42	9.31	74.00	18.58	267	109	Vertical
2	2952.9882	45.04	9.67	54.00	8.96	288	68	Vertical
3	4960.0000	29.76	-17.47	54.00	24.24	243	319	Vertical
4	4960.0000	42.26	-17.47	74.00	31.74	274	265	Vertical
5	7440.0000	48.54	-9.35	74.00	25.46	288	342	Vertical
6	7440.0000	38.09	-9.35	54.00	15.91	154	342	Vertical
7	17935.0968	47.31	0.70	54.00	6.69	165	191	Vertical

Final Data List

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
- 4) All Modes have been tested, but only the worst case data displayed in this report.



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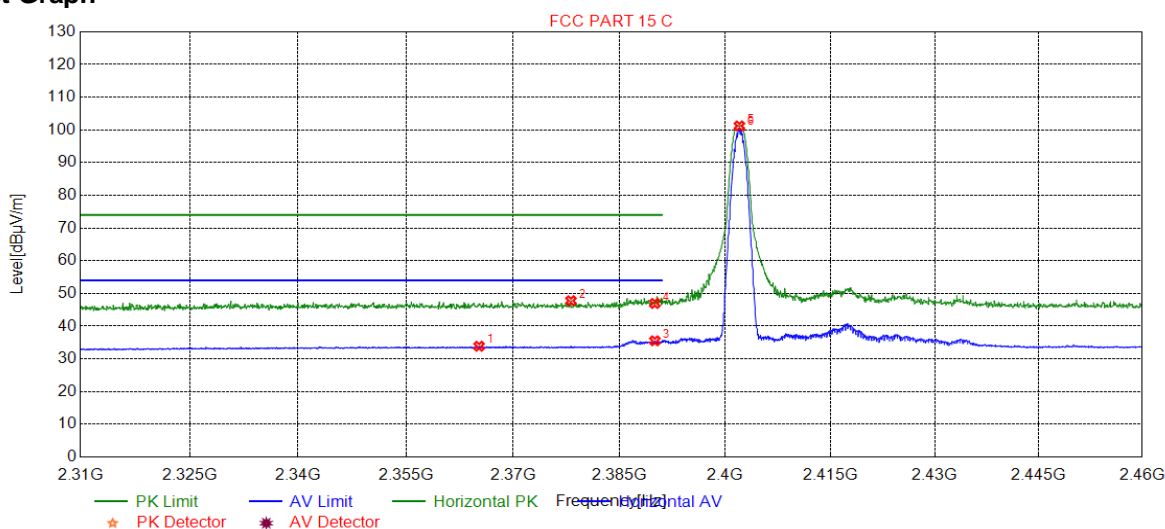
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1.2 Restricted bands around fundamental frequency

1.2.1 Test plots

1.2.1.1 BLE_1M_Channel 0

Test Graph



Suspected List

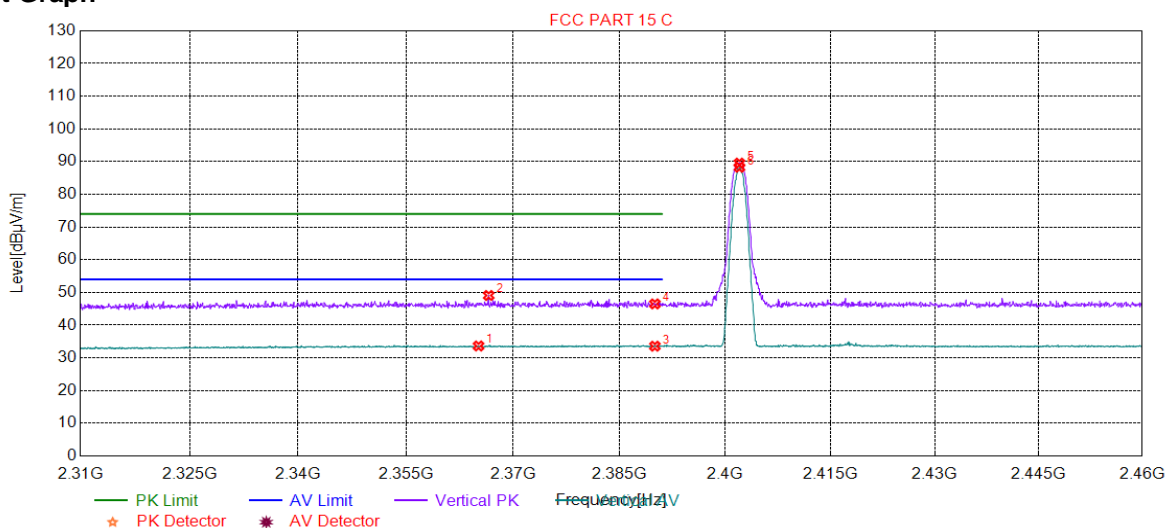
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2365.2276	33.88	7.79	54.00	20.12	176	212	Horizontal
2	2378.1341	47.79	7.78	74.00	26.21	198	201	Horizontal
3	2390.0000	35.53	7.77	54.00	18.47	208	228	Horizontal
4	2390.0000	46.96	7.77	74.00	27.04	235	206	Horizontal
5	2402.0000	101.24	7.77	0.00	-101.24	218	222	Horizontal
6	2402.0000	100.67	7.77	0.00	-100.67	245	222	Horizontal

Final Data List



1.2.1.2 BLE_1M_Channel 0

Test Graph



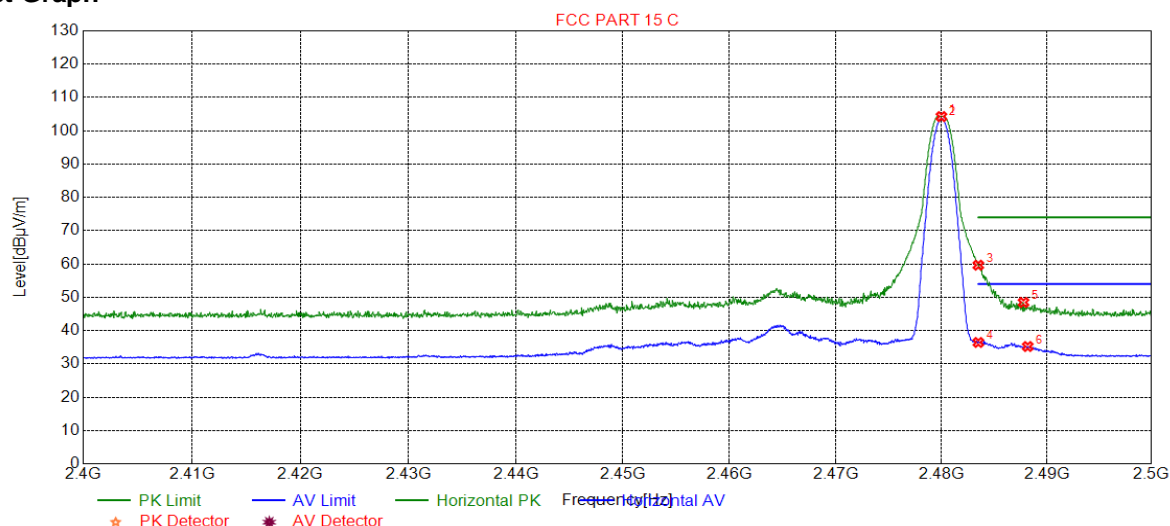
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2365.1526	33.65	7.79	54.00	20.35	159	66	Vertical
2	2366.5783	49.09	7.79	74.00	24.91	270	309	Vertical
3	2390.0000	33.58	7.77	54.00	20.42	240	187	Vertical
4	2390.0000	46.51	7.77	74.00	27.49	280	325	Vertical
5	2402.0000	89.55	7.77	0.00	-89.55	245	331	Vertical
6	2402.0000	88.28	7.77	0.00	-88.28	208	60	Vertical

Final Data List

1.2.1.3 BLE_1M_Channel 39

Test Graph



Suspected List

Suspected List

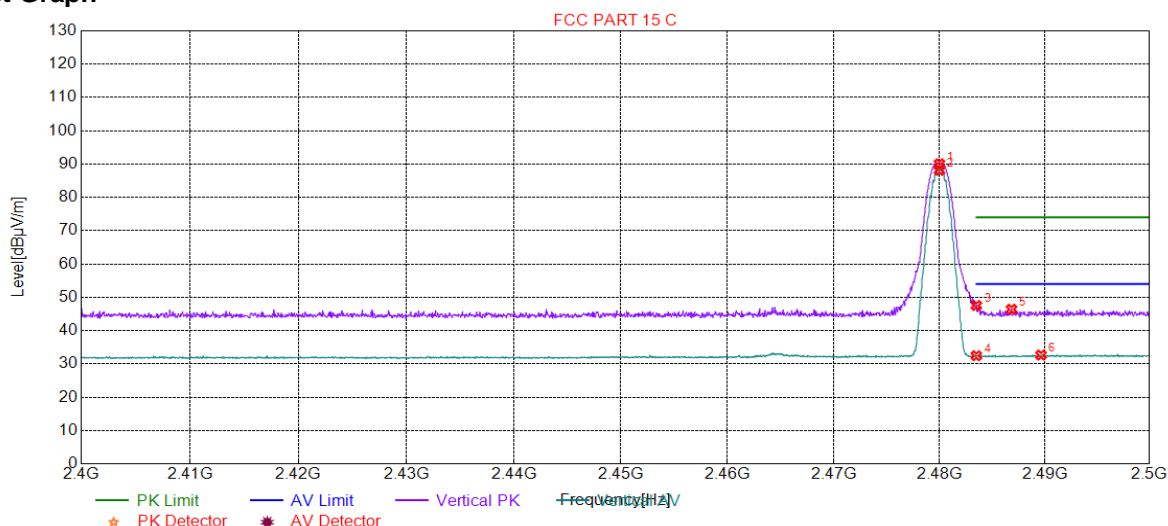
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.0000	104.27	8.01	0.00	-104.27	239	212	Horizontal
2	2480.0000	103.59	8.01	0.00	-103.59	190	212	Horizontal
3	2483.5000	59.66	8.01	74.00	14.34	147	207	Horizontal
4	2483.5000	36.47	8.01	54.00	17.53	225	212	Horizontal
5	2487.7939	48.47	8.02	74.00	25.53	111	157	Horizontal
6	2488.1941	35.25	8.02	54.00	18.75	143	224	Horizontal

Final Data List



1.2.1.4 BLE_1M_Channel 39

Test Graph



Suspected List

Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.0000	90.10	8.01	0.00	-90.10	234	42	Vertical
2	2480.0000	88.10	8.01	0.00	-88.10	289	25	Vertical
3	2483.5000	47.57	8.01	74.00	26.43	284	52	Vertical
4	2483.5000	32.48	8.01	54.00	21.52	268	52	Vertical
5	2486.8434	46.44	8.01	74.00	27.56	156	47	Vertical
6	2489.6448	32.68	8.02	54.00	21.32	162	0	Vertical

Final Data List

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

All Modes have been tested, but only the worst case data displayed in this report.

